REMARKS

Claims 19, 11-38, 40-48 are pending in the application. Claims 1, 26, and 34 have been amended. No new matter has been added. Reconsideration of the claims is respectfully requested.

Information Disclosure Statement

Information disclosure statements were submitted in this case on June 17, 2002; August 26, 2002; and April 4, 2003. Receipt of these IDSs, and acknowledgment that the references cited therein have been considered, have not yet been received. The Examiner is respectfully requested to forward initialed copies of the 1449 forms submitted with these IDSs.

Provisional Double Patenting Rejections

Claims 1-9, 10-38 and 40-48 were provisionally rejected under the judicially created doctrine of obvious-type double patenting as being unpatentable over claims of copending applications 10/015,151 and 10/014,277.

Applicant notes that these double patenting rejections are provisional. These rejections will not be addressed until one of the applications, either the applications used as the basis for the rejections, or the present application, is issued as a patent. At that time, Applicant will be able to properly address the provisional double patenting rejection according to MPEP § 804. Applicant does not acquiesce to the reasons stated for the provisional double patenting rejections.

Rejections under 35 U.S.C. § 102

Claims 1-9, 11, 16-23, 34, 37-42 47 and 48 are rejected under 35 U.S.C. §102 (b) as being anticipated by Chang-Hasnain et al. (U.S. Patent 6,233, 263) (Chang). Applicant notes that, since Chang issued as a patent on May 15, 2001 and the present application was filed on December 11, 2001, the period of time between Chang issuing and the present application being filed was less than twelve months. Accordingly, a rejection under § 102(b) is improper.

Chang teaches a monitoring and control assembly for an optical system that includes a tunable laser (Abstract). A first photodetector is provided and a wavelength selective filter is tilted at an angle relative to the optical axis that provides an angular dependence of a wavelength reflection of the wavelength selective filter and directs the reflected output beam towards the first

photodetector (Abstract). Various embodiments are shown, e.g. FIGs. 4, 6, 7, 10, 12-18 and 20, where first and second photo diodes (24 and 28) are used to detect different optical signals from the wavelength selective filter (20).

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Therefore, all claim elements, and their limitations, must be found in the prior art reference to maintain a rejection based on 35 U.S.C. §102. Applicants respectfully submit that Chang does not teach every element of independent claim 1, and therefore fails to anticipate claim 1.

Independent Claim 1

The invention of independent claim 1 is directed to a device for determining frequency of a laser producing an output light beam having a laser frequency. The device comprises a fringe-producing optical element to generate an interference pattern from light derived from the output light beam. The fringe-producing optical element is a non-parallel etalon and the interference pattern defines a pattern period. A detector unit is disposed to detect the interference pattern. The detector unit includes at least three detector elements disposed to detect respective portions of the pattern period. A control unit is coupled to receive detection signals from the detector unit and is adapted to generate a laser frequency control signal in response to the detection signals from the at least three detector elements for controlling the laser frequency.

In particular, Chang fails to s control unit that generates a laser frequency control signal in response to detection signals from at least three detector elements. It is important first to note that, in all of the figures that show a control loop, i.e. FIGs. 7, 14 and 20, Chang shows the use of only two photodetectors to generate a control signal. It is stated in the Office Action that Chang teaches the detection of at least three different portions of the interference pattern to generate at least three respective detection signals at col. 4, line 61 onwards and at col. 7, lines 25 onwards. Applicant respectfully disagrees and contends that, although Chang teaches the use of an array of

detectors, Chang teaches that the feedback signal fed to the laser is based only on signals received from two of the photodetectors.

At col. 4, lines 61-65, the following is stated in Chang: "Two or more photodetectors may be employed. In one embodiment, the array of photodetectors 24 is utilized. More than one photodiode can be used greater discrimination in monitoring and control of laser 12, as more fully described hereafter [sic]". Thus, in this portion of the specification, Chang only states that it is possible to provide two or more photodetectors and that greater discrimination can be obtained by using more than one detector over the case where only one detector is used. It is important to note that what is "more fully described hereafter" is only a method of controlling the wavelength of the laser based on signals from two photodiodes, not three, as is further explained in the following paragraphs.

At col. 5, lines 58-67, it is stated: "For dense WDM applications, where precise wavelengths are required, differential detection scheme [as opposed to the single photodetector schemes shown in FIGs. 1-3] is utilized to further enhance accuracy. A differential detector scheme *compares the output from a pair of photodetectors* 24. *When there is an array, there is still comparison between a pair of adjacent or non-adjacent photodetectors* 24, one comparison at a time. When a pair of photodetectors is used a difference in response of the two photodetectors is used to determine the wavelength deviation from a pre-set wavelength." (emphasis added) Thus, the only approach to controlling the laser that Chang teaches is by comparing the signals from two different photodetectors. This is consistent with the circuits shown in FIGs. 7, 14 and 20.

The use of different photodetectors is further explained at col. 7, lines 25-31, where it is stated: "In various embodiments, laser 12 can be coupled with any number of photodetectors. With a plurality of photodetectors, *different pairs of photodetectors can be used for wavelength subsets in a broader wavelength range. Thus the use of multiple pairs of photodetectors provides coverage for any selected wavelength range.* An array of photodetectors can be used." (emphasis added). Thus, Chang explains that although multiple photodetectors can be used, they are only used two at a time: the use of a pair of photodetectors allows the use to control the laser over a wavelength range associated with that pair of photodetectors. Different pairs of photodetectors permit the measurement of wavelength over respectively different ranges of wavelength.

In view of Chang's statements summarized above, it becomes clear that Chang does not teach that the laser control signal is generated in response to detector signals from at least three detector elements. Instead, Chang only teaches the use of two detector signals to generate the control signal. Consequently the operating wavelength of Chang's laser is adjusted based on the use of only two photodetectors, not three photodetectors.

Since Chang fails to teach all the elements of independent claim 1, and so claim 1 is not anticipated by Chang.

Independent Claim 34

Claim 34 comprises, *inter alia*, a control unit that generates a laser frequency control signal in response to detection signals received from at least three detector elements, and not simply on signals received from a pair of detector elements as taught by Chang. Accordingly, claim 34 is also not anticipated by Chang.

Independent Claim 47

Independent claim 47 is directed to a laser device that comprises a laser generating an output light beam and an optical element that generates an interference pattern from light derived from the output light beam, the interference pattern defining a pattern period. A detector unit is disposed to detect the interference pattern and includes at least three detector elements disposed to detect respective portions of the interference pattern period. A control unit is coupled to receive detection signals from the detector unit related to the respective portions of the interference pattern period. The control unit generates a signal indicative of laser power from the detection signals.

There is no mention in Chang of detecting at least three portions of an interference pattern and then generating a signal indicative of laser power in response. First, Chang only teaches that two detectors are used at any one time, not three detectors. Furthermore, Chang only teaches using the signals from the two detectors for sensing the frequency of the laser light, not the power of the laser light. Accordingly, Chang, fails to teach that the control unit generates a signal indicative of the laser power based on the detected portions of the interference pattern.

Thus, Chang fails to teach all the elements of claim 47, and so claim 47 is not anticipated by Chang.

Dependent Claims

Dependent claims 2-9, 11, 16-23, 37-42 and 48, which are dependent from independent claims 1, 34 and 47, were also rejected under 35 U.S.C. §102(b) as being unpatentable over Chang. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made above in connection with independent claims 1, 34 and 47. These dependent claims include all of the limitations of the base claim and any intervening claims, and recite additional features which further distinguish these claims from the cited references. Therefore, dependent claims 2-9, 11, 16-23, 37-42 and 48 are also in condition for allowance.

Regarding claims 3–5 and 30, Applicants respectfully assert that Chang fails to teach the particular separation between the detector elements as claimed, and also assert that Chang fails to mention any relationship between the period of the interference pattern and the detector spacing. Futhermore, Applicants assert that the claimed relationships between detector spacing and interference pattern period are not automatically met through the use of a detector array, particularly since the claimed spacing is related to the at least three detectors that are simultaneously used to detect the different portions of the interference pattern.

Regarding claims 20 and 21, Chang fails to teach that the control unit generates a signal indicative of laser power from the detection signals generated by the detector elements that detect the interference pattern, i.e. fails to teach that the same detector signals that are used to control frequency are also used to detect the laser power. Furthermore, Chang fails to controlling the laser power based on the detection signals that are used to control the laser frequency.

Rejections under 35 U.S.C. § 103

Dependent Claim 12

Dependent claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Chang in view of Russell (U.S. Patent No. 6,151,114). It is stated in the Office Action that Chang, fails to show the use of a non-parallel having at least one curved surface, and that Russell teaches such an etalon. It is also stated that it would have been obvious to one of ordinary skill in the art to use Russell's etalon in order to differentiate the effects of the arrival angle of the beam from the wavelength of the beam.

Russell teaches the use of a dome etalon (70) which presents a range of angles to the incident laser energy at the same time (col. 7, lines 55-59).

Three criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference, or combination of references, must teach or suggest all the claim limitations. MPEP § 2142. Applicant respectfully traverses the rejections since the prior art fails to disclose all the claim limitations, and there would be no motivation to combine the references in the manner proposed.

Applicants do not admit that Russell's domed etalon is a non-parallel etalon: the two surfaces of the etalon appear to be concentric arcs, and so the two surfaces can be considered to be parallel to each other.

More importantly, however, the motivation to combine Russell with the Chang is lacking. Russell describes a coherent laser warning system for detecting the presence of incident radiation which is substantially coherent, such as the light from a laser (col. 3, lines 39-42), by detecting the presence of fringes. The invention of claim 12, on the other hand, is not to detect whether or not interference fringes are present, but to detect different portions of the interference fringe pattern and to control the frequency of the laser based on the resulting detection signals. Accordingly, there is no need to make a determination as to whether the light is coherent or not: its coherence is already assumed in the present technique, since the light is output from a laser. Furthermore, the purported motivation for combining Russell with Chang is to differentiate the effects of the arrival angle of the beam. There is no issue, however, with the present invention as to the arrival angle of the beam. In fact, if the direction of the laser beam varied in the manner alleged by the Examiner, the resulting fringe pattern would change with direction, even if the frequency of the laser itself remained the same. Thus, if the laser's angle of incidence on the fringe-producing element changed from time to time, it would not be possible to stabilize the frequency of the laser. Thus, one of ordinary skill would not by motivated in the manner set forth in the Office Action, since there would be no expectation that the laser's frequency would be controllable.

Accordingly, the proposed combination of references fails to teach or suggest all the elements of the invention of claim 12, and there would be no motivation to combine the

references in the manner proposed. Claim 12 would, therefore, be patentable over the proposed combination of references.

Claims 22-25 and 43-46

Claims 22-25 and 43-46 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Chang and DeAndrea et al. (U.S. Patent No. 5,515,468) (DeAndrea). It is stated in the Office Action that Change does not expressly show the elements of the laser, but that DeAndrea shows the elements of the laser including the power source and the collimating and focusing elements. It is alleged in the Office Action that one or ordinary skill in the art would have a stable laser source.

DeAndrea teaches different approaches to packaging semiconductor lasers. DeAndrea does not, however, remedy the deficiencies of Chang discussed above with regard to claims 1 and 34. These claims are, therefore, not unpatentable over the proposed combination of references.

Claims 26-33

Claims 26-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chang in view of Sharma et al. (U.S. Patent No. 6,331,906) (Sharma). It is stated in the Office Action that Chang does not show the elements of the communications systems, but that Sharma does show the claimed elements and that it would have been obvious to one of ordinary skill in the art to combine the teachings of Chang with Sharma in order to have a communications system with a stable light source.

The invention of claim 26 is directed to an optical communications system which includes, *inter alia*, a laser wavelength stabilizing unit that has a non-planar etalon to generate an interference pattern from light derived from the output beam, the interference pattern defining a pattern period, a detector unit disposed to detect the interference pattern, the detector unit including at least three detector elements disposed to detect respective portions of the interference pattern, and a control unit coupled to receive detection signals from the detector unit and adapted to generate a laser frequency control signal in response to the detection signals from the at least three detector elements for controlling wavelength of the at least one of the one or more lasers.

Neither Chang nor Sharma teaches or suggests detecting three different portions of an interference pattern and generating a frequency control signal in response to the consequent three

detection signals. Instead, as has been discussed with respect to claim 1, Chang teaches the use of pairs of detectors to detect laser frequency. Sharma does not teach or suggest laser frequency stabilization. Accordingly, the proposed combination of references fails to teach or suggest all the elements of claim 26, and so claim 26 is not unpatentable over the proposed combination of references.

Claims 27-33, which depend from claim 26, further distinguish the invention. Since these claims depend from claim 26, which is allowable over the proposed combination of references, these claims are also allowable.

Furthermore, neither of the proposed references teaches of suggests the particular relationship between the separation of the detectors and the interference fringe spacing, or the additional detectors detecting the same phase of the interference pattern, as set forth in claims 27-30.

Conclusions

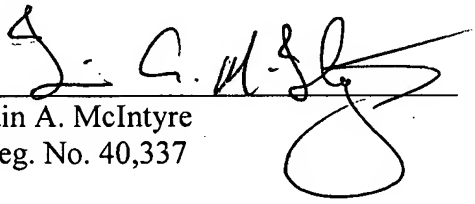
In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Iain A. McIntyre at 612-436 9610.

Respectfully submitted,

CCVL P.A.
Customer Number 38846

Date: June 21, 2004

By: 
Iain A. McIntyre
Reg. No. 40,337